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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/753,397	01/03/2001	Yushi Jinno	2933SE-62-DIV	2805
22442	7590	11/01/2005	EXAMINER	
SHERIDAN ROSS PC 1560 BROADWAY SUITE 1200 DENVER, CO 80202			WILSON, ALLAN R	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/753,397	JINNO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Allan R. Wilson	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 1-6 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Response to Amendment*

In view of the RCE filed 09/19/2005, the amendment filed on 08/04/2005 under 37 CFR 1.131 has been considered but is ineffective to overcome the references. Claims 1-6 are withdrawn and claims 7-12 stand rejected.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,548,132 to Batra et al. in view of US 4,975,760 to Dohjo et al.

With regard to claims 7 and 8, Batra et al. teach, with reference to figures 4-7 and the text beginning in column 5, line 62, a bottom gate thin film transistor 50 comprising:

- an insulator substrate 53,
- a gate electrode 54 located on the insulator substrate,
- an insulator film 56/58 provided on the substrate and gate electrode, and
- an active layer 60 including a polycrystalline silicon film on the insulator film where a drain 70, a source 72 and a channel 62 over the gate electrode are defined, wherein grain sizes of the whole of the drain and source are greater than a grain size of the channel (see the description

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of the first embodiment of Batra (col. 2, lines 1-34) which teaches that the source/drain regions alone are made amorphous and annealed such that their grain size is larger than that of the channel. Note also that while Batra shows in figs. 4-7 only the drain offset 66 having a larger grain size, it is taught in column 6, lines 8-10 that the channel region alone may be masked such that the entire source and drain regions have the larger grain size, not merely the offset region).

Batra did not expressly teach that the gate electrode was formed of a refractory metal or that the gate has tapered end portions corresponding to the drain and source, that the gate has a higher thermal conductivity than the substrate or that the gate was operable to dissipate energy received at the polysilicon film adjacent the gate. Rather, Batra teaches that the gate electrode may be formed of polysilicon (col. 4, lines 54-58). Dohjo et al. teach, with reference to figure 3 and column 7, lines 22-25, that a gate electrode 17 of a thin film transistor may comprise a refractory metal (Mo-Ta alloy) having a taper. Batra et al. and Dohjo et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to form the device of Batra et al. using a refractory metal gate electrode with a taper rather than polysilicon. The motivation for doing so, as is taught by Dohjo et al., is that the use of a refractory metal in place of polysilicon reduces the resistivity of the gate (col. 2, lines 59-62) while a taper prevents a possible step damage on the gate electrode (col. 7, lines 28-32). That a refractory metal gate electrode has a higher thermal conductivity than the insulating substrate and that it is operable to dissipate energy are no more than inherent properties of a refractory gate over an oxide substrate. Therefore, it would have been obvious to combine Batra et al. and Dohjo et al. to obtain the invention of claims 7-12.

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With regards to claims 7 and 8, the examiner had to assume what the product would be by the process claimed. For example, in claim 7 it was assumed that the product was the polycrystalline silicon film. The claim that it was “laser light irradiated on surface of an amorphous silicon film to form the polycrystalline silicon film” was not considered to have full patentable weight. A “product by process” claim is directed to the product per se, no matter how actually made, MPEP 2113 “Product-by-Process Claims,” In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90; In re Marosi et al, 218 USPQ 289; and particularly In re Thorpe, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a “product by process” claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in “product by process” claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear.

With regard to claims 9 and 10, Batra et al. teach that the grain size of the channel is 0.1  $\mu\text{m}$  (1000 Å) which is at least about 500Å and will provide desired device characteristics such as on current. With regard to claims 11 and 12, Batra et al. did not expressly teach that the grain size of the channel were in a range of 1500 – 20,000 Å or 3000 – 10,000 Å. Because Batra et al. did teach that the grain size of the channel was approximately 1000Å, it is considered obvious that one of skill in the art would form the channel region having grain sizes in the range of 3000 – 10,000 Å. The motivation for doing so, as is taught by Batra et al., is that larger grains will have fewer grain boundaries and fewer dangling Si bonds to trap carriers (col. 2, lines 39–41).

***Response to Arguments***

Applicant's arguments filed 08/04/2005 have been fully considered but they are not persuasive.

The argument that Batra does not does not disclose grain sizes of the whole of the drain and source that are set greater than a grain size of the channel based on the energy of laser light irradiated on a surface of an amorphous silicon film to form the polycrystalline silicon film" is not persuasive. Batra discloses in col. 6, lines 8-10, "Alternately in accordance with an aspect of the invention, masking layer 64 could be patterned to protect only the channel region" (emphasis added). Protecting only the channel region would leave the whole drain and source regions exposed and recrystallize upon elevated temperature to form polycrystalline silicon having a second average grain size which is greater than the first average grain size (col. 6, lines 16-20).

The argument that "Dohjo does not disclose grain sizes of the whole of the drain and source that are set greater than a pain size of the channel based on the energy of laser light irradiated on a surface of an amorphous silicon film to form the polycrystalline silicon film" is not persuasive. Dohjo is used to disclose the gate electrode of a thin film transistor may comprise a refractory metal (Mo-Ta alloy) having a taper. Dohjo is combined with Batra. Batra illustrates grain sizes of the drain and source can be greater than the channel (as noted above).

Any inquiry concerning this communication or earlier communications from an examiner should be directed to Primary Examiner Allan Wilson whose telephone number is (571) 272-1738. Examiner Wilson can normally be reached 7:00-4:00 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "A. R. Wilson", with a long horizontal flourish extending to the right.

Allan R. Wilson  
Primary Examiner  
26 October 2005